2) Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions or conditions involving specific substances; and

3) Location-specific ARARs restrict actions or contaminant concentrations in certain environmentally sensitive areas.

2.21.2 Chemical specific ARARs

Chemical specific ARARs are usually health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values are potential applicable standards established by USEPA. Chemical specific ARARs are summarized in Table RD-2.

MCLs are ARARs for the COCs in groundwater at the Site. The health advisory level for nickel in groundwater is considered a To Be Considered (TBC) as it is provided as guidance for regulators but is not a legally enforceable federal standard.

State chemical-specific ARARs in some cases are the same as Federal ARARs as the SCDHEC has incorporated the Federal MCLs into the South Carolina Code of Regulations, 61-58.5. In accordance with South Carolina Code of Regulations, 61-68(H), all groundwaters in the State are classified as "GB" and must be maintained at or restored to drinking water quality unless:

1. In an approved mixing zone, where certain limitations apply (i.e., impacted groundwater is contained within property boundaries and groundwater is not used on the property);

2. Groundwater is reclassified as "GC." Groundwater may be classified as GC if it is (a) not a potential underground source of drinking water (based on current use or potential future uses based on hydrogeologic properties and dissolved solids), or (b) "otherwise contaminated beyond levels that allow cleanup using methods reasonably employed in public water systems treatment. The groundwater also must not migrate to Class GA or Class GB groundwater or have a discharge to surface water that could cause degradation."

Regulation 61-68, "Water Classifications and Standards" states that all groundwater of the State are classified as Class GB until reclassified through administrative procedures. Therefore, the quality standards for Class GB groundwater set forth in the State Primary Drinking Water Regulations, R.61-68, are enforceable. In addition, Regulation 61-68 is an ARAR for surface water at the Site.

2.21.3 Action Specific ARARs

Action specific ARARs are triggered by the type of remedial action under consideration and are summarized in Table RD-3.

2.21.4 Location-Specific ARARs

Location-specific ARARs are based on site-specific considerations. No location specific ARARs are identified at this time for the Site. Location-specific ARARs that were researched for this Site are contained in Table RD-4 for reference.

2.22 Remedial Goals/Clean Up Levels

Remedial goals (RGs) are medium and chemical-specific clean-up levels. These levels are required to consider completion of remedial activities and to obtain no further action upon attainment of the specified clean up levels. The proposed clean up levels were developed based on ARARs (State and Federal standards/criteria), risk assessment, and refining and/or use of PRGs developed during the RI phase. In the absence of chemical-specific ARARs, RGOs calculated in the revised HHRA and revised BERA for COCs in the impacted media at the Site were used as proposed clean up levels.

The following sections summarize the media and constituent specific clean up levels for the Site.

2.22.1 Groundwater

The clean up levels for the COCs in groundwater at the Site were based on USEPA/SCDHEC MCLs for drinking water and RGOs developed in the revised HHRA. Table 2-4 summarizes the COCs in groundwater and the clean up levels.

2.22.2 Hydric Soils and Sediments

Currently, there are no known Federal and State ARARs for hydric soils and sediments. Therefore, the clean up levels are based on protection of ecological receptors (i.e., benthic invertebrate and wetland plants) and are listed in Table 2-5.

2.22.3 Surface Water

Table 2-6 summarizes the clean up levels for the COCs in the surface water. These clean up levels were based on South Carolina surface water standards (South Carolina Rule 61-68).

2.22.4 Sludge in Former Equalization Lagoon

Table 2-7 summarizes the clean up levels for the COCs identified in the sludge/waste in the former equalization lagoon. The clean up levels are based on a comparison of concentrations of the constituents detected in the sludge/waste with the USEPA Region 9 industrial PRGs.

2.23 Comparative Analysis of Alternatives

This section comparatively analyzes the relative performance of each alternative for the impacted media at the Site with respect to the nine criteria as outlined in the National Contingency Plan (NCP) and as listed in the Summary of Evaluation Criteria on page 110 of this ROD.

2.23.1 Comparative Analysis of Alternatives for the Former Equalization Lagoon

The following sections present comparative analysis of the relative performance of each alternative for the remediation of former equalization lagoon sludge.

2.23.1.1 Overall Protection of Human Health and the Environment

The no action alternative (S1) is not expected to be protective of human health and the environment as it does not involve active remediation to reduce risk. Alternative S2 (excavation with off-site disposal) is most protective of human health and environment because the source material is removed from the Site; therefore, the on-site residual risks would be significantly eliminated. Alternative S3 (onsite capping) also is protective by providing a cap to minimize the potential for source material releases into the environment. However, accidental removal or deterioration (if not properly maintained) of the cap (pavement) can provide exposure to contaminated sludge/waste and would compromise the protection of human health and environment. Alternative S4 (on-site stabilization/solidification and capping) reduces the mobility of contaminants in the sludge/waste and the capping portion of this alternative minimizes the potential for leaching of constituents into groundwater. Therefore, Alternative S4 is also protective of human health and environment. Institutional controls would be required for Alternatives S3 and S4, which would restrict future use of the lagoon area for construction or re-development. Among all the alternatives evaluated for the former equalization lagoon, Alternative S2 is most protective of human health and environment.

2.23.1.2 Compliance with ARARs

No chemical-specific ARARs are currently available for COCs in the lagoon sludge if left in place. Alternatives S1, S3, and S4 require institutional controls (deed restriction). Alternatives S2 and S4 would have to meet regulations for on-site or off-site disposal. In addition, Alternatives S2 through S4 would require compliance with OSHA requirements. Alternative S2 also has to comply with DOT regulations for transportation of impacted soil and CERCLA requirements for disposal of impacted soil. Both Alternatives S2 and S4 are required to comply with OSHA excavation standards. Alternatives S2, S3, and S4 are anticipated to comply with ARARs.

2.23.1.3 Long-Term Effectiveness and Permanence

In the former equalization lagoon, Alternative S1 (No action) will not reduce residual risk. Although residual risks are minimal, Alternative S2 would provide a permanent remedy for the Site due to removal and disposal of impacted material at an off-site permitted facility (e.g., Subtitle D facility). Due to levels of COCs present in the sludge and their characteristics (low leaching potential based on the TCLP tests performed during the RI), low residual risks are anticipated for Alternatives S3 and S4 as the sludge would be stabilized and/or capped. The residual risk for Alternative S4 is slightly lower than that for Alternative S3 because the sludge would be stabilized/solidified thereby reducing the leaching potential. Alternatives S3 and S4 have significantly lower residual risk compared to that of Alternative S1. Among the alternatives evaluated, Alternative S2 appears to have the lowest residual risk as it is a permanent remedy,

Alternatives S3 and S4 would require some level of institutional controls (i.e., deed restrictions) and/or long-term management (e.g., maintenance of the asphalt/concrete cap) since the sludge/waste will remain in the former lagoon. Therefore, future development of the former lagoon area would be restricted.

2.23.1.4 Reduction of Toxicity, Mobility, or Volume

Alternative S1 is not expected to reduce toxicity, mobility, or volume other than that which may be reduced by natural processes. Reduction of toxicity, mobility or volume of constituents in the excavated soil depends on treatment and disposal processes selected by the off-site facility. Alternative S2 essentially results in complete removal of impacted sludge/waste and soil above the RGs from the Site. Since the soils in Alternative S2 will be disposed of at a permitted facility (e.g., Subtitle D landfill), the mobility is expected to be reduced by implementation of proper control measures at that facility (e.g., bottom liner and capping typically required by their permit). However, toxicity and volume reduction will depend on natural processes, as the non-hazardous soil typically does not require treatment.

The capping component (e.g., asphalt or concrete pavement or foundation) of Alternatives S3 and S4 reduces mobility by isolating the waste stream from surface migration pathways and reduces the potential for surface water infiltration and leaching of constituents in to groundwater. The cap will likely not affect toxicity and volume. In Alternatives S3 and S4, the toxicity and volume reductions will depend upon natural processes. In Alternative S4, mobility of constituents in the sludge/waste in the former lagoon is reduced by stabilization/solidification with an appropriate binder. Among the alternatives evaluated, it is anticipated that Alternatives S2 and S4 will provide the most reduction in toxicity, mobility or volume of COCs in the sludge/waste of the lagoon.

2.23.1.5 Short-Term Effectiveness

Alternative S1 and the existing cap/cover on the former lagoon for Alternative S3 are the least intrusive alternatives. Risk to workers during implementation of Alternatives S2 and S4 include exposure to source material; however, this risk would be minimized when proper health and safety procedures are used. Engineering controls (e.g., dust

suppression) would also significantly minimize exposure to contaminants during implementation and will be protective to the community. These controls would be required for Alternatives S2 and S4.

Alternatives S2, S3, and S4 are expected to have some potential impact on the community if proper controls are not implemented. Some impact could be due to increased truck traffic, and the possibility of a release of contaminants to the environment as a result of potential traffic accidents. This is not a common occurrence, and the magnitude of impact would be low. The duration of the remedial action is the greatest for alternatives S2 and S4.

2.23.1.6 Implementability

Alternative S1 is readily implementable because no construction activity is required. Alternative S3 requires maintenance of the cap over the former lagoon and can also be readily implemented. It is anticipated that the other two Alternatives S2 and S4 can be implemented using standard construction equipment and techniques. Among the alternatives evaluated, Alternative S4 would likely be the hardest to implement as it involves excavation and stabilization of impacted material and then backfilling of the stabilized material with a cap over the former lagoon.

2.23.1.7 Cost

The present worth estimated probable cost for Alternatives S1, S2, S3 and S4 is $66,800, $143,400, $91,500 and $219,200, respectively. Alternative S1 has the lowest probable cost followed by Alternatives S3, S2 and S4.

2.23.1.8 State/Support Agency Acceptance

The State of South Carolina concurs with the Selected Soil Remedy for the equalization lagoon.. The South Carolina Department of Health and Environmental Control (SCDHEC) has been an active participant in the Remedial Investigation and Feasibility Study for this site, as well as the Proposed Plan and this Record of Decision. Natural Resource Trustees were also advised prior to the start of the RI/FS and their participation was solicited. The South Carolina Department of Health and Environmental Control has submitted a letter to document their concurrence with this ROD.

2.23.1.9 Community Acceptance

Although members of the community submitted comments on the Proposed Plan, verbally at the Proposed Plan Public Meeting and in writing during the comment period, no comments were received that suggested any alternatives to the Selected Soil Remedy. There were no vocalized objections to the Selected Remedy. A few members of the community have expressed concern over personal health issues. SCDHEC and EPA have met with several individuals to discuss these issues, and to discuss water supply well and general RI sample results. In addition, a separate meeting was held with several residents

to present historic data the State routinely collects regarding cancer incidence in the community, which is less than the State average in the site area.

2.24 Comparative Analysis of Groundwater Alternatives

The following sections compare groundwater alternatives using the same NCP criteria used in the previous evaluation of alternatives for the Equalization Lagoon.

2.24.1.1 Overall Protection of Human Health and the Environment

Alternative GW1 (No action) is not expected to be protective of human health and the environment as it does not involve active measures that would reduce exposure (e.g., institutional controls or source reduction measures). Due to close proximity of residential water supply wells, Alternative GW2 (MNA) may not be protective of human health and environment unless restriction of groundwater use is adopted by the local municipality for the Site and the neighboring properties, and alternative water supply is provided.

Alternative GW3 would potentially provide better protection of human health and the environment as compared to Alternatives GW1 and GW2. However, Alternative GW4 is potentially the most protective of human health and environment as compared to the other three alternatives. Alternative GW3 is only a containment remedy and is expected to operate for a long period (possibly greater than 30 years) where as Alternative GW4 is an active in-situ remedy and is expected to require monitoring for a relatively shorter time frame (e.g., 10 years). ERD treatment is expected to significantly reduce concentrations of chlorinated VOCs at the Site and the remedy would be permanent (chlorinated VOCs are reduced to non-toxic forms such as ethane and carbon dioxide). The resulting reduction of COCs in Alternative GW4 will further enhance MNA of the residuals. Due to active treatment of key COCs in groundwater supplemented with MNA, Alternative GW4 will provide better protection compared to other alternatives.

2.24.1.2 Compliance with ARARs

Alternative GW1 is not expected to comply with ARARs as no active remedy or controls would be involved. The remaining three alternatives are expected to comply with ARARs. Alternatives GW2 and GW3 are expected to require long term monitoring (e.g., 30 years or more) prior to reaching chemical-specific ARARs. ERD treatment of key COCs followed by MNA in Alternative GW4 is expected to reduce the time required to comply with ARARs as compared to other alternatives. Although it is difficult to predict the exact time duration required to reach ARARs for Alternative GW4, the time frame is anticipated to be lower than that for the other alternatives.

2.24.1.3 Long-Term Effectiveness and Permanence

Alterative GW1 (No action) is not expected to reduce residual risk. Residual risk is expected to be reduced for Alternative GW2 through natural processes and institutional controls (deed/groundwater use restrictions). Residual risk would be reduced for

Alternative GW3 through hydraulic containment of groundwater. Among the alternatives considered, the residual risk for Alternative GW4 would be lowest due to active and in-situ treatment of groundwater at the Site, which is more aggressive than the other alternatives. ERD technology in Alternative GW4 has been successfully used for remediation of organic and inorganic constituents at various sites throughout the nation. Because the effectiveness of in-situ treatment alternatives is controlled by biogeochemical conditions and hydrogeology at the Site, pilot studies would be required to develop design criteria for Alternative GW4. Similarly, a long-term pump test would be required for Alternative G3. Because limited data is currently available to evaluate COC trends in groundwater, long-term data collection would be required to evaluate trends for Alternatives GW2, GW3, and GW4. Due to active treatment, duration of long-term monitoring is expected to be lower for Alternative GW4 than for other alternatives.

2.24.1.4 Reduction of Toxicity, Mobility, or Volume

Alternative GW1 has no impact on reduction in toxicity, mobility, or volume other than that which might occur due to natural attenuation. For Alternative GW2, reduction of toxicity, mobility and volume would depend upon the natural processes occurring at the Site. Reduction of toxicity, mobility and volume would be high for Alternatives GW3 and GW4 due to active treatment of the dissolved plume at the Site. However, Alternative GW3 is less effective in reducing volume of the contaminants. ERD technology (Alternative GW4) can potentially reduce the constituents into other products, which are generally more innocuous in nature. Among the alternatives considered, Alternative GW4 has the greatest potential to reduce the toxicity and volume of key constituents in the groundwater at the Site.

2.24.1.5 Short-Term Effectiveness

Alternative GW1 requires no construction or intrusive activities. The remaining alternatives require the installation of groundwater extraction wells, injection wells, and monitoring wells which can be done by a local contractor/driller. In addition, Alternatives GW3 and GW4 may require clearing of trees in some areas to install extraction/injection wells. Risk of exposure to the neighboring properties from groundwater usage during implementation of Alternatives GW3 and GW4 would be minimized or eliminated. However Alternative GW2 would require implementation of groundwater use restrictions and provision of an alternative water supply. Risk of exposure of chemicals and impacted groundwater to workers is relatively higher for Alternative GW3 as compared to Alternatives GW2 and GW4 due to extraction of impacted groundwater. However, this risk would be reduced through implementation of proper procedures and the use of appropriate health and safety measures.

Alternatives GW2 and GW3 will require long-term monitoring of natural attenuation (30 years or higher) whereas Alternative GW4 is expected to have a relatively shorter monitoring period (e.g., 10 years) due to reduction of groundwater contaminants with active treatment in a portion of the dissolved TCE and CT plume.

2.24.1.6 Implementability

All four alternatives can be easily implemented. Alternative GW1 has no construction activity and is easiest to implement. It is easy to implement Alternative GW2 as it involves routine groundwater monitoring for natural attenuation. Groundwater monitoring in Alternative GW3 is labor intensive while ERD treatment portions of Alternative GW4 are relatively less labor intensive, easily implementable, and require shorter period of monitoring. Alternative GW3 would require a trained and qualified technician whereas Alternative GW4 needs a trained, but non-qualified technician due to simple mixing injection processes. Installation of groundwater wells, recovery wells, and injection wells in Alternatives GW2, GW3 and GW4 can be implemented using standard construction equipment and techniques.

2.24.1.7 Cost

The present worth estimate of probable cost for Alternatives GW1, GW2, GW3, and GW4 is $173,900, $1,373,200, $5,496,700 and $2,434,200, respectively. These costs include capital and operation and maintenance (O&M) (including monitoring) costs. Alternative GW1 has the lowest probable cost while Alternative GW3 has the highest.

2.24.1.8 State/Support Agency Acceptance

The State of South Carolina concurs with the Selected Groundwater Remedy for the site. The South Carolina Department of Health and Environmental Control (SCDHEC) has been an active participant in the Remedial Investigation and Feasibility Study for this site, as well as the Proposed Plan and this Record of Decision. Natural Resource Trustees were also advised prior to the start of the RI/FS and their participation was solicited. The South Carolina Department of Health and Environmental Control has submitted a letter to document their concurrence with this ROD.

2.24.1.9 Community Acceptance

Although members of the community submitted comments on the Proposed Plan, verbally at the Proposed Plan Public Meeting and in writing during the comment period, no comments were received that suggested any alternatives to the Selected Groundwater Remedy. There were no vocalized objections to the Selected Remedy. A few members of the community have expressed concern over personal health issues. SCDHEC and EPA have met with several individuals to discuss these issues, and to discuss water supply well and general RI sample results. In addition, a separate meeting was held with several residents to present historic data the State routinely collects regarding cancer incidence in the community, which is less than the State average in the site area.

2.24.2 Comparative Analysis of Alternatives for Sediments, Hydric Soils, and Surface Water

The following section compares each hydric soil, sediments, and surface water alternative with the evaluation criteria.

2.24.2.1 Overall Protection of Human Health and the Environment

Alternative SHSSW1 is not protective of human health and the environment as it does not involve implementation of an active remedy to reduce risk. If the impacted hydric soils and sediments soils are not remediated, the potential unacceptable ecological receptor exposure pathways may remain complete. Alternative SHSSW2 is most protective of the ecological receptors/the environment (no unacceptable human health risks) because the impacted material will be removed from the Site; therefore, it provides a permanent remedy for the Site and residual risks would be significantly minimized. Alternative SHSSW3 also is protective due to limited removal of hydric soils and sediments and some impacted hydric soils. Capping of impacted hydric soils in the Imhoff area wetlands is expected to minimize infiltration to surface water. However, due to source material being in contact with shallow ground water, there is a potential for leaching of metals into groundwater and discharge to surface water. In addition, accidental removal or deterioration (if not properly maintained) of the cap can provide exposure to contaminated soils and would compromise the protection of the environment (ecological receptors). Lastly, Alternative SHSSW2 (an on-site wetland restoration) provides slightly better opportunity for wetland recovery than Alternative SHSSW3 (an off-site wetland restoration). In summary, Alternative SHSSW2 provides the most protection to the environment including surface water.

2.24.2.2 Compliance with ARARs

No known chemical-specific ARARs are present for hydric soils and sediment, but are available for surface water. Alternative SHSSW1 is not expected to comply with ARARs. Alternatives SHSSW2 and SHSSW3 are expected to comply with chemical-specific ARARs as long as proper procedures are followed. These ARARs include compliance with ecological target risk concentrations (i.e., proposed RGs), OSHA regulations for PPE, DOT regulations for transportation of impacted soil, CERCLA requirements for disposal of impacted soil, OSHA requirements of excavation, SCDHEC and county erosion and sedimentation control requirements and air quality/emission requirements.

2.24.2.3 Long-Term Effectiveness and Permanence

Alternative SHSSW1 is not anticipated to reduce residual risks in the areas of impact. The residual risk would be minimal, if any, with Alternative SHSSW2 because the majority of the contaminated material would be removed and disposed off-site at a permitted facility. However, residual risk would exist for Alternative SHSSW3 due to capping of untreated material, and potential for some leaching of contaminants over time. Therefore, the potential for residual risk associated with Alternative SHSSW3 is relatively higher than that for Alternative SHSSW2. Alternatives SHSSW2 and SHSSW3

have significantly lower residual risk compared to that of Alternative SHSSW1. Among all the alternatives, Alternative SHSSW2 appears to have the lowest residual risk.

Alternatives SHSSW2 and SHSSW3 would require some level of controls or long-term management. Alternative SHSSW3 leaves isolated spots of contaminated soils that are under the engineered cap at the Site without removal. Alternative SHSSW3 would require the highest degree of long-term maintenance due to capping of impacted soils at the Dixie-Narco property and would require deed restrictions.

2.24.2.4 Reduction of Toxicity, Mobility, or Volume

Alternative SHSSW1 would not have any impact on reduction in toxicity, mobility, or volume other than that which occurs through natural processes. The capping component of the SHSSW3 alternative reduces mobility of constituents by isolating the waste stream from surface migration pathways. The cap does not affect toxicity or volume.

The reduction of toxicity, mobility and volume of COCs at the Site would be higher for Alternative SHSSW-2 due to excavation and off-site disposal at a permitted facility. However, toxicity and volumes in the excavated soils will not be reduced, as these soils/sediments would not require treatment. Since the hydric soils and sediments in this alternative will be disposed of at a permitted facility (e.g., Subtitle D landfill), the mobility is expected to be reduced by the implementation of proper control measures at that facility (e.g., capping and bottom liner required by their permit). However, toxicity and volume reduction depends on natural processes, as the non-hazardous soil typically does not require treatment. Because the volume of COCs in impacted hydric soil and sediment would be reduced, this alternative would result in reduction of mobility of COCs into surface water and groundwater better than Alternative SHSSW3.

In summary, Alternative SHSSW2 will result in a greater reduction of toxicity and mobility as compared to other alternatives at the Site.

2.24.2.5 Short-Term Effectiveness

Alternative SHSSW1 and MNA portions for Alternatives SHSSW2 and SHSSW3 require no intrusive activity. Risk to workers during implementation of Alternatives SHSSW2 and SHSSW3 would include exposure to source material; however, this risk would be minimized when proper health and safety procedures are used. Engineering controls (dust suppression and erosion control) would significantly minimize exposure to contaminants and will be protective to the community. These controls would be required for Alternatives SHSSW2 and SHSSW3.

Alternatives SHSSW2 and SHSSW3 are expected to have some potential impact on the community if proper controls are not implemented. Some impact could be due to increased truck traffic, and the possibility of a release of contaminants to the environment as a result of potential traffic accidents involving a disposal truck. This is not a common occurrence, and the magnitude of impact would be low.

The duration of the remedial action is expected to be the greatest for the on-site capping alternative (SHSSW3), mainly due to the inaccessibility of the impacted hydric soils in the wetland area.

2.24.2.6 Implementability

Alternative SHSSW1 can be readily implemented because no construction activity is required. Alternatives SHSSW2 and SHSSW3 are implementable with certain specialized construction techniques. The excavation components of these alternatives can be implemented using standard construction equipment with the addition of high floatation types of vehicles or specialized swamp mats. Both Alternatives SHSSW2 and SHSSW3 would require implementation of a substantial erosion/siltation control plan. Tree/vegetation clearing would be required to access impacted soils especially in forested Wetland Cover Type C where the area is currently functioning as a bottomland hardwood swamp.

Therefore, implementation of a removal or capping remedy in this area would be difficult. Implementation of Alternative SHSSW2 (an in situ Imhoff area wetland restoration) provides slightly better opportunity and is less challenging for wetland recovery than Alternative SHSSW3 (an ex situ wetland restoration, which would involve creation of a replacement wetland).

2.24.2.7 Cost

The present worth estimate of probable cost for Alternatives SHSSW1, SHSSW2, and SHSSW3 are $140,600, $2,591,000 and $2,665,600, respectively. Alternative SHSW1 has the lowest probable cost followed by Alternatives SHSSW2 and SHSSW3.

2.24.2.8 State/Support Agency Acceptance

The State of South Carolina concurs with the Selected SHSSW Remedy for the site. The South Carolina Department of Health and Environmental Control (SCDHEC) has been an active participant in the Remedial Investigation and Feasibility Study for this site, as well as the Proposed Plan and this Record of Decision. Natural Resource Trustees were also advised prior to the start of the RI/FS and their participation was solicited. The South Carolina Department of Health and Environmental Control has submitted a letter to document their concurrence with this ROD.

2.24.2.9 Community Acceptance

Although members of the community submitted comments on the Proposed Plan, verbally at the Proposed Plan Public Meeting and in writing during the comment period, no comments were received that suggested any alternatives to the Selected Soil, Sediment and Surface Water Remedy. There were no vocalized objections to the Selected Remedy. A few members of the community have expressed concern over personal health issues.

SCDHEC and EPA have met with several individuals to discuss these issues, and to discuss water supply well and general RI sample results. In addition, a separate meeting was held with several residents to present historic data the State routinely collects regarding cancer incidence in the community, which is less than the State average in the site area.

2.25 Principal Threat Wastes

The NCP establishes the expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). Identifying principal threat waste combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile, which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Two types of principal threat wastes are present at the Admiral Site: the contaminated sediments and hydric soils in the Imhoff discharge area and downstream, and the contaminated waste in the former equalization lagoon at the Admiral Site are "principal threat wastes" because the chemicals of concern are found at concentrations that pose a significant risk to either human or ecological receptors. The contamination has caused MCL exceedances in area supply wells. The ecological toxicity tests performed on soils and sediments in the discharge and stream areas showed toxicity with increased mortality and decreased growth.

While the SHSSW and S selected remedies do not include a treatment alternative, the proposed alternatives are implementable, less costly, and more feasible than treatment of the contaminated sediments and hydric soils would be. Excavation and Off-Site Disposal, would significantly reduce the risks posed by these principal threats by removal, but not by treatment methods. It is not expected, based on the contaminant concentrations, that treatment would be required prior to off-site disposal.

2.26 Summary of the Selected Remedy

EPA and SCDHEC have been actively involved throughout the Remedial Investigation, the Feasibility Study, and the preparation of this Record of Decision. The following summary of each component remedy for the Admiral Home Appliance Site is EPA's decision on how to best address the site contamination considering all nine decision criteria.

2.26.1 Equalization Lagoon (S-2)

The preferred remedy for the equalization lagoon is excavation with off-site disposal (S2). It is designed to remove contaminated material in the former equalization lagoon that exceeds applicable clean up levels. It is estimated that the lagoon is 45 feet by 35 feet and goes to a depth of 8 feet below the current rear parking lot of Dixie-Narco. The estimated volume of excavation is 470 cubic yards with some 240 CY as sludge/soil in the lagoon. After removal, confirmatory samples will be taken from soil at the bottom

and sidewalls of the excavation to verify impacted material has been removed. Confirmatory samples with be taken with one sample per 20 by 20 foot grid. These samples will be analyzed for semi-volatile organic compounds (SVOCs) and selected metals including chromium, iron, nickel and zinc.

The excavated sludge/waste and soil will be stockpiled and characterized prior to disposal, which will occur at an off-site permitted disposal facility. Samples taken earlier from the lagoon did not fail TCLP leaching analysis. Therefore, it is anticipated that the excavated materials will be nonhazardous. Remaining excavated soils with contaminants of concern (COCs) below the RGs will be used to backfill the excavated area. Finally, the excavated area will be covered with asphalt and or concrete. A detailed cost estimate for the implementation of this remedy is contained in Table 5-2.

2.26.2 Ground water (GW-4)

The preferred alternative for groundwater (GW4) is Enhanced Reductive Dechlorination (ERD) to remediate the TCE and CT contamination. ERD consists of adding nutrients to the groundwater to encourage the breakdown of contaminants by naturally occurring bacteria. These nutrients are typically food-grade substances such as molasses, vegetable oil, or corn syrup. These nutrients are pumped, poured, or injected into the aquifer through a series of wells. Sampling at the AHA Site has demonstrated that a small amount of the contaminants are already being broken down in this way; however, the process is moving very slowly. By adding a food source and creating the proper conditions for microbial activity, ERD can help the existing bacteria break the groundwater contaminants down to simple, non-toxic harmless end products. The nutrients injected into the groundwater are not toxic or harmful to people. The bacteria/micro-organisms are already living in the groundwater and are not harmful to people.

It is anticipated that approximately 160 points/wells will be installed in the TCE plume including 23 injection points/wells in the leading edge of the plume to the north-northeast of Charleston Street. Similarly, approximately 90 injection points/wells will be installed in the CT plume representing CT concentrations at or above 20 µg/L. It is anticipated that injection wells will be installed at depths ranging from 65 to 85 feet.

A field scale pilot test will be required to estimate the quantities of carbohydrate solution and to determine the design parameters (i.e. spacing and number of injection wells/points, frequency of injection) prior to design of a full scale system. The number of injection wells and locations will be adjusted in the remedial design phase based on the results of the field scale pilot study. Monitored natural attenuation (MNA) will be used in conjunction with the active remedy to address dissolved contaminants in groundwater in both on and off site areas. As part of MNA, groundwater monitoring will be performed to monitor and evaluate if natural processes are assisting the attenuation of the dissolved contaminants. Groundwater modeling may also be required to determine the monitoring period for this alternative. Approximately 30 monitoring wells will be sampled for

VOCs and biogeochemical parameters quarterly in year 1, semiannually for years 2 through 5, and annually from years 6 through 10.

EPA had previously added mercury to the list of Contaminants of Concern for groundwater at the AHA Site. EPA requires additional on-site sampling be conducted to definitively eliminate an on-site source of mercury.

This selected alternative includes quarterly sampling of 20 residential wells that are located Northeast of the site downgradient from the Site. This sampling will also make the remedy consistent with the recommendations of the Admiral Home Appliances Public Health Assessment, prepared by SCDHEC for ATSDR. The number and the frequency of residential well sampling may be adjusted either upward or downward depending on the results of the sampling and the timing of provision of public drinking water to the residents. Bottled water will continue to be provided to any home utilizing water from these 20 residential wells with COC exceedances of the Safe Drinking Water Act MCLs (SDWA, which is the Remedial Goal for groundwater) until these homes are placed on a public water supply. Payment of tap fees into the new water supply line for residential wells with COC MCL exceedances is required. Barnwell County has obtained a Community Development Block Grant for the specific purpose of extending the Town of Williston public water to the neighborhood Northeast of the site. It should be noted that this neighborhood is outside the municipal boundaries of the Town of Williston. It should also be noted that expansion of the Town of Williston's municipal water lines to the affected neighborhood should be completed within one year, possibly sooner. The provision and connection to a municipal water supply is a key component of the Selected Remedy GW-4.

The preferred groundwater remedy (GW4) will also require the selection of a contingency remedy since the Selected Remedy contains monitored natural attenuation (MNA) as a component. EPA Directive 9200.4-17P requires a contingency remedy be contained in the Record of Decision. Should the ERD remediation not prove successful in reducing groundwater COC levels at the Five Year Review, EPA would require implementation of the groundwater pump and treat alternative GW-3 as the contingency remedy for groundwater, or the best available technology available at the time that ERD may be shown to be unsuccessful. Success of the ERD will be defined by a continued trend of reduction in the concentration of the VOCs listed in Table 2-4 during the first five years of implementation of the groundwater remedy. A detailed cost estimate for the implementation of this remedy is contained in Table 5-8. Table 5-8 does not include an additional $50,000 to $100,000 for implementation of the mercury sampling activities.

2.26.3 Sediment, Hydric Soil, & Surface Water (SHSSW-2)

The preferred alternative for the discharge area, wetlands, and stream is removal and off-site disposal of sediments and hydric soil, and monitored natural attenuation of surface water. This alternative involves the excavation or dredging of impacted sediments and hydric soils utilizing mechanical equipment. Once the material is removed and stockpiled, confirmation samples will be collected to verify that the COCs in the

remaining soils/sediment meet RGs. The stockpiled material will be characterized for disposal in a Subtitle D landfill. The quantity of impacted hydric soil in the Imhoff wetland area in cover type A and B was estimated to be 3,050 cubic yards. Cover type C removal volumes have not been quantified. In addition, approximately 1800 feet of stream bed sediment will be excavated to a depth of 1 foot. Stockpiled material may require dewatering or stabilization depending on the disposal facility. Liquids from potential dewatering would be sent to Dixie-Narco's pretreatment facility. The excavation and restoration of the area to RGs including all cover types(A, B, and C) will be costly with total costs dependant on material volumes that will be determined only after excavation and confirmatory sampling.

The excavated wetlands will be backfilled with similar soils, graded, and restored in accordance with state and federal requirements after the removal and disposal of contaminated material. EPA believes that contaminated streams, stream banks, and wetlands can be restored or reconstructed successfully. EPA's Selected Remedy for the wetland area between the former Imhoff System location and Charleston Street requires as complete a removal of impacted sediments and hydric soils as necessary to meet clean up levels with full wetland and stream bank restoration or reconstruction.

The MNA initially contained in the proposed plan was designed to collect samples from 26 locations consisting of 6 sediment, 10 hydric soils, and 10 surface water locations. The scope of Selected Remedy SHSSW2 includes the development and implementation of a sampling program between Charleston Street to and including Willis Millpond to collect data not included in the RI/FS in regard to toxicity and to better monitor the MNA in this downstream area. Such a sampling program would as a minimum include 12 additional sampling stations (not including 3 new background stations). Toxicity testing will be necessary, as part of this MNA monitoring, to confirm acceptable levels of impact in lower levels of the food chain. A confirmatory toxicity testing program in the downstream area between Charleston Street and Willis Millpond will be implemented for year one and year five of the sampling program. The additional cost for the SHSSW2 remedy as expanded by EPA is estimated to be an additional $151,800 for the first five years plus the additional costs for more extensive wetlands excavation and restoration than the initial cost estimate envisioned.

Because the Selected Remedy for soil, hydric soil, and surface water includes a MNA component, a contingency remedy is also necessary. As a contingency, based on results of the one year and five year toxicity test results, the remedy could be expanded to include additional excavation in the area between Charleston Street, along Spur Branch, and possibly in Willis Millpond. A detailed cost estimate for the implementation of this remedy is contained in Table 5-11. Table 5-11 does not include the additional $151,800 for the MNA/toxicity sampling program.

2.27 Changes since Proposed Plan

A number of changes were made to the Selected Remedy since the publication of the Proposed Plan. These changes were the result of written and verbal comments received

during the comment period, and the input of SCDHEC. The investigation for definitive mercury source location has been modified in scope to a focused sampling program on-site. EPA will develop a statement of work for this effort prior to the remedial design. EPA has better defined "successful" in the GW-4 remedy. The residential well sampling program has been reduced in scope from 23 wells to 20. The payment of residential water bills for home with COC MCL exceedances has been eliminated. The provision of bottled water by the PRPs in the past and offer for payment of future tap fees has been acknowledged. The provision of bottled water will continue to all homes in the affected area with COC MCL exceedances until public water is supplied. Vinyl chloride has been removed from the groundwater RGs, now listed as clean up levels. The wording and objective of the selected SHSSW-2 remedy has been clarified. The Selected Remedy requires a complete remediation of the area from the former Imhoff System to Charleston Street for Cover Types A, B, and C to Clean Up Levels with necessary wetland and streambank restoration or reconstruction. The year three toxicity testing has been eliminated. Sampling for MNA including toxicity testing between Charleston Street to Willis Millpond has been clarified.

2.28 Outcomes of the Selected Remedy

The implementation of the Selected Remedy will benefit the site and the surrounding area. The removal of the equalization lagoon and contents will remove a potential source area for future groundwater contamination. The additional investigation of the mercury on site will resolve both public and agency concerns. The ERD groundwater remedy will reduce CT and TCE contamination via treatment. The residential water supply monitoring program, provision of bottled water, and future connections to Williston public water will insure safe drinking water for all area residents near the site. The wetlands and stream excavation and restoration will remove an aesthetically blighted and ecologically damaged area and restore it to a fully functioning habitat. The expanded monitoring for the stream beyond Charleston Street will insure that the MNA component of SHSSW-2 will perform as designed. Final clean-up levels for each affected mediaare listed in Tables 2-4, 2-5, 2-6, and 2-7.

2.29 Available Land Use after Cleanup

Land uses in the area of the site are not anticipated to change after the cleanup. The cleanup, with provision of public water supply to the adjacent neighborhood, and the reduction of CT and TCE in the groundwater will encourage additional residential growth in that area. The restoration of the adjacent wetlands and stream area will improve the aesthetics, provide better habitat for fish and wildlife further encouraging growth in the area.

2.32 Final Cleanup Levels

Table 2-4
Clean-up Levels
COCs in Groundwater
Admiral Home Appliance Site, Williston, South Carolina

Constituent	SC DHEC/USEPA MCL ug/L
VOCs	
Benzene	0.005
Carbon tetrachloride	0.005
Dichloromethane	0.005
1,1-Dichloroethene	0.007
Tetrachloroethene	0.005
Trichloroethylene	0.005
Metals	
Mercury	0.002
Nickel	0.313(health based, non MCL)

Table 2-5
Clean-up Levels
COCs in Hydric Soils & Sediments
Admiral Home Appliance Site, Williston, South Carolina

Constituent	Sediment mg/kg	Hydric Soil mg/kg
Metals		
Chromium (total)	250	450
Nickel	150	500
Zinc	450	1400

Table 2-6
Clean-up Levels
COCs in Surface Water
Admiral Home Appliance Site, Williston, South Carolina

Constituent	SC WQC (µg/L)
Metals	
Chromium (total)	10.87
Copper	1.21
Nickel	7.16
Zinc	16.22

Table 2-7
Clean-up Levels
COCs in Waste (Equalization Lagoon)
Admiral Home Appliance Site, Williston, South Carolina

Constituent	RG Risk=10^{-6} (mg/kg)	RG HI = 1.0 (mg/kg)
SVOCs		
Bis(2-ethylhexyl)phthalate	123	NC
Metals		
Chromium (total)	448	NC
Iron	NC	310,000
Nickel	NC	20,400
Zinc	NC	310,000

2.33 Anticipated Environmental & Ecological Benefits

Implementation of the Selected Remedy will provide both environmental and ecological benefits. Removal of the remaining waste from the former equalization lagoon will remove a potential source of contamination from the site. The treatment of groundwater with ERD will reduce TCE and CT to MCLs benefiting both human health and the environment. The removal of contaminated sediments and hydric soil in the discharge area to Charleston Street will eliminate a source area contributing to surface water degradation and impaired habitat for flora and fauna. The restoration and/or reconstruction of the excavated wetlands and stream banks will greatly improve the quality of the currently impaired ecological habitat. If either the groundwater contingency remedy or the sediment, hydric soil, and surface water remedy is expanded as a contingency, the anticipated environmental and ecological benefits will still occur, just at a time further into the future.

2.34 Future Activities

The input provided at the Proposed Plan Public Meeting on 8/25/2005 has been combined with any written comments provided to EPA during the 30 day comment period. EPA has both finalized the Selected Remedy of the Proposed Plan and answered the public's comments in this document, the Record of Decision. Answers to the public comments are contained in the Part 3: Responsiveness Summary section of this Record of Decision. This Record of Decision is EPA's final position on the necessary remedies to be implemented to cleanup the AHA Site.

Negotiations will begin with the PRPs to sign a Consent Decree (CD) to implement the remedies contained in this Record of Decision. When the Consent Decree is lodged with the court, the PRPs are required to begin to design and implement the remedies, although such activities can begin prior to the CD's lodging. This phase of the Superfund process is known as Remedial Design/Remedial Action (RD/RA). This phase should begin in late-2006.

2.35 Statutory Determinations

Under CERCLA § 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections describe how the Selected Remedy meets these statutory requirements.

Protection of Human Health & the Environment